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A NEW SPECIES OF CROCODILIAN FROM THE TORREJON BEDS.[1]

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INTRODUCTION

In the American Museum collections of fossil reptiles are the remains of a crocodilian from the Torrejon Beds at Torrejon Arroyo, New Mexico. This material was collected by Mr. Walter Granger in 1912. It consists of a nearly perfectly preserved lower jaw, teeth and skull fragments, vertebræ, and limb and girdle bones. No crocodilian remains have hitherto been reported from the Torrejon beds, and the remains under consideration differ considerably from all other crocodilian material available for comparison or described in the literature. The remains are therefore assigned to a new species. Further study may necessitate their reference to a new genus. From the comparisons that have been made, these remains show a greater similarity to *Leidyosuchus* Lambe than to any other known crocodilian genus. The remains are therefore referred to a species of *Leidyosuchus*, though remains of this genus have not hitherto been found above the Cretaceous.

Leidyosuchus multidentatus, new species

TYPE.—Amer. Mus. No. 5179. Complete lower jaws, 12 vertebræ, left ilium, left tibia, several isolated teeth.

TYPE LOCALITY AND LEVEL.—Torrejon Arroyo, New Mexico; Torrejon Beds, Paleocene. Collected by Mr. Walter Granger in 1912.

SUMMARY OF SPECIFIC CHARACTERS.—Mandible very long in proportion to its breadth, the breadth constituting only 29 per cent. of the length, compared with 54 per cent. in *L. sternbergii*. Undulation of alveolar border slight. Number of teeth greater than in other species, being 28 in each ramus. Splenials just reach symphysis, which extends back to the level of the fifth teeth.

DESCRIPTION OF TYPE IN DETAIL.—This species is characterized by a very long slender mandible with a short symphysis, and with a large number of teeth. This combination of characters is rare, or

[1]Contribution to the Osteology, Affinities, and Distribution of the Crocodilia, No. 19.

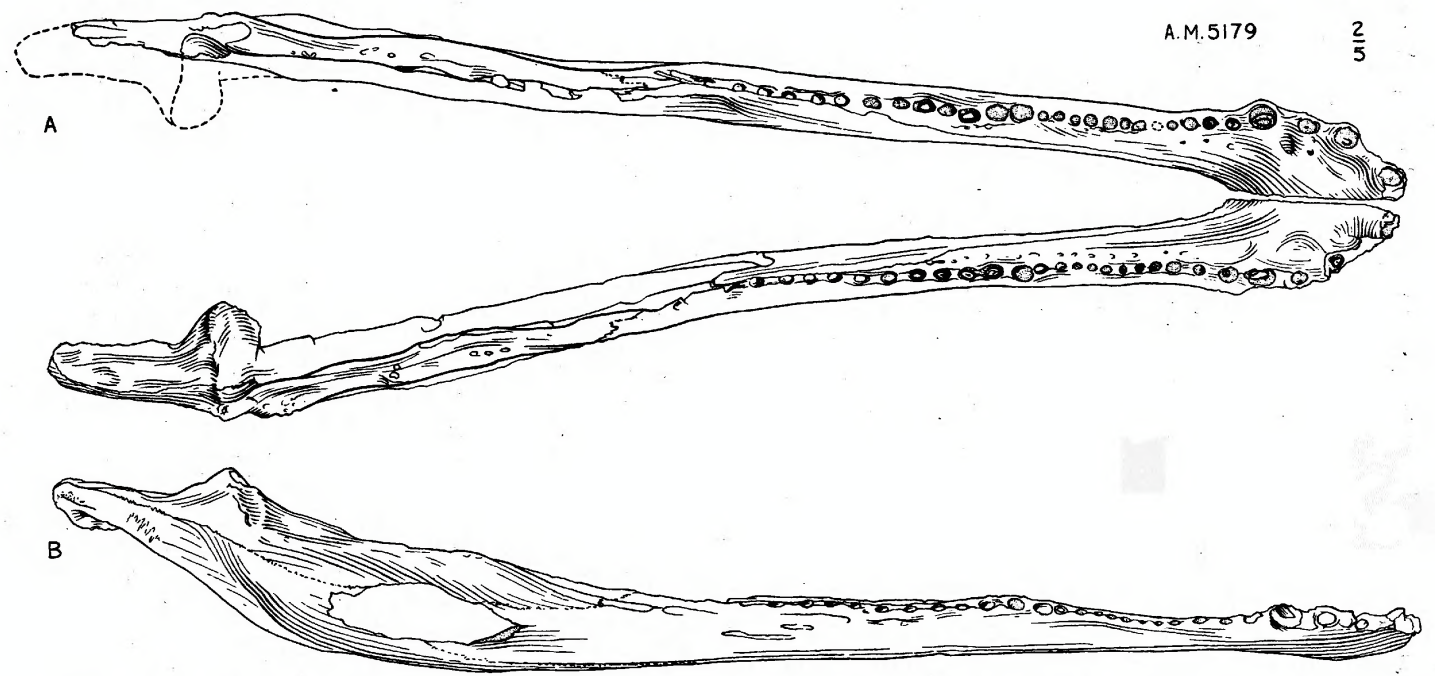

Fig. 1. *Leidyosuchus multidentatus*, new species. Type, jaws, Amer. Mus. No. 5179. Two-fifths natural size. A, superior view; B, lateral view, right side.

previously unknown, among the Crocodilia. Invariably, long slender jaws with many teeth possess a long symphysis, with splenial forming a considerable portion of it. This is true irrespective of the systematic position of the example. In the form under discussion the number of teeth and the slender proportions suggest some of the typical long-snouted crocodilians such as the gavials or tomistomas. The symphysis, however, is as short as in the extremely short-snouted crocodilians. The nearest approach to this condition is among some of the relatively short-snouted alligators and caimanoid forms, and the Cretaceous species *Leidyosuchus sternbergii* Gilmore. The alligatoroid forms differ materially

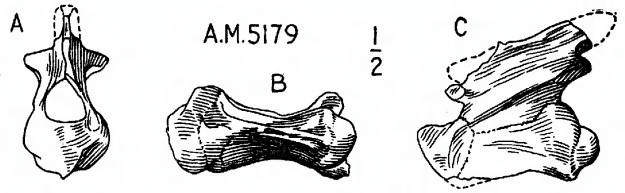

Fig. 2. *Leidyosuchus multidentatus*, new species. Type, axis vertebra (Cervical 2), Amer. Mus. No. 5179. One-half natural size. A, anterior view; B, inferior view; C, lateral view, left side.

from the present species in many characters, but *L. sternbergii* differs chiefly in possessing shorter and broader jaws and less numerous teeth. In many of the details of the jaw structure, the resemblance is striking.

The amount of festooning of the alveolar border is very slight. In a jaw the size of the one under discussion this cannot be ascribed to immaturity of the specimen, but must be considered a specific character. The edges of the alveoli of the first four mandibular teeth are elevated somewhat above the alveolar border, and are separated from each other by short diastemata. The first pair of alveoli is near, but not at, the median line. The first alveoli are 9 mm. apart from each other. Alveoli 1 are 10 mm. from alveoli 2. In order of their anteroposterior diameters the alveoli are: Nos. 4, 1, 2, 16, 3, 17. Alveoli 4, 1, 2 are much larger than 16 and 17. The rest of the alveoli are small. Each alveolus is complete in itself, no two alveoli being confluent.

The symphysis extends backward to the level of the fifth mandibular alveoli. The splenials enter the symphysis, but comprise no essential part of it. On either side of the median line, anterior to the level of the fourth mandibular teeth, the superior surface of the dentary is somewhat depressed. In the depression are several pits, somewhat nearer to the

alveolar line than to the median line. The shaft of each ramus is very slender, and is broad in proportion to its height. It is subtriangular in cross-section. The external mandibular foramen is small. The region of the internal mandibular foramen is not well enough preserved to permit adequate description.

MEASUREMENTS

Right ramus of jaw	
Length	415.5 mm.
Length of dental row	232 est.
Length of external foramen	52.
Number of alveoli	28
Height, minimum	10
Left ramus of jaw	
Length	409.5 mm.
Length of dental row	232
Length of external foramen	55
Height, minimum	9.5
Number of alveoli	28
Symphysis	
Length	52
Number of alveoli on each side	5
Both rami	
Length along median line	411
Breadth across articular condyles	125
Breadth across symphysis	60

The vertebræ and limb and girdle bones appear somewhat small in comparison with the size of the jaws. This is true, also, however, of the type material of *Leidyosuchus canadense* Lambe.

The vertebræ consist of Cervicals 2, 4, 6, 7, Dorsals 2 and 13, Lumbar 1, Sacral 1 and Caudals 2, 5, and 7. These determinations are provisional, as the number of vertebræ in the crocodilian column is variable, and the specimens themselves are far from complete. The determinations do indicate approximately, however, the positions of the vertebræ preserved. As compared with the axis of an adult *Crocodilus americanus*,[1] the axis of the present specimen is longer in proportion to its breadth. The spine is well preserved except at its distal extremity, and is characterized by a somewhat prominent prespinal lamina. The zygapophyses are well preserved, and have suffered but little crushing. The prezygapophyses are small, but are distinctly discernible. The distance across

[1]Mook, C. C. 1921. Notes on the Postcranial Skeleton in the Crocodilia. Bull. Amer. Mus. Nat. Hist., XLIV, Art. 8, pp. 67-100, especially 71 and 72. April 12.

the prezygapophyses is 60 per cent. of the distance across the postzygapophyses, in comparison with 85 per cent. for the same proportion in *Crocodilus americanus;* it is not likely that this difference is due to crushing of the fossil specimen. In a young specimen of *Alligator mississippiensis*, the prezygapophyses of the axis are broader than the postzygapophyses. A very prominent ridge, or lamina, extends, on each side, upward and backward from the prominent process that supported

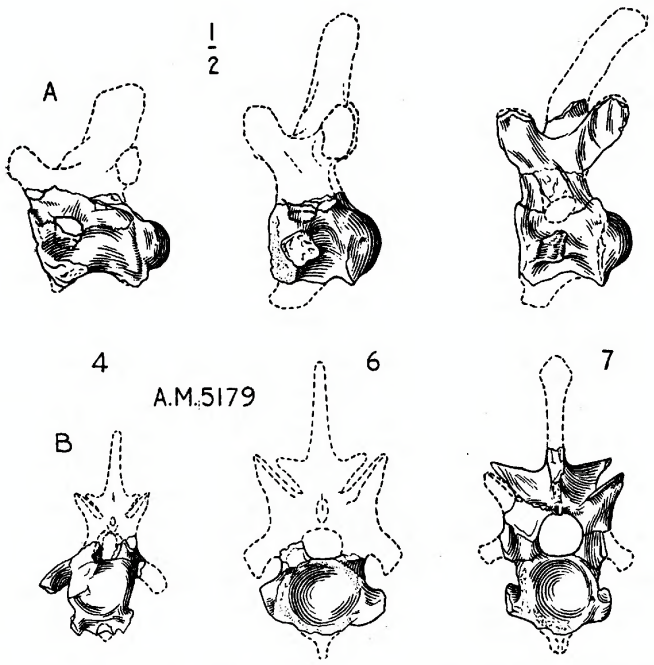

Fig. 3. *Leidyosuchus multidentatus*, new species. Type, cervical vertebræ, Amer. Mus. No. 5179. One-half natural size. A, lateral views, left side; B, anterior views. 4, 6, 7, fourth, sixth, and seventh cervical vertebræ, respectively.

the axial rib, to the postzygapophysis of the corresponding side. I have not observed a similar lamina in any other crocodilian vertebra. The odontoid region is well developed, but is somewhat indistinguishable from adhering matrix. The body of the centrum is very slender, and terminates inferiorly in a thin, sharp edge; this character may have been accentuated somewhat by crushing. The posterior ball is very prominent. Cervical 4 is less well preserved. The spine, zygapophyses, and most of the lower neural arch region are missing. The diapophysial

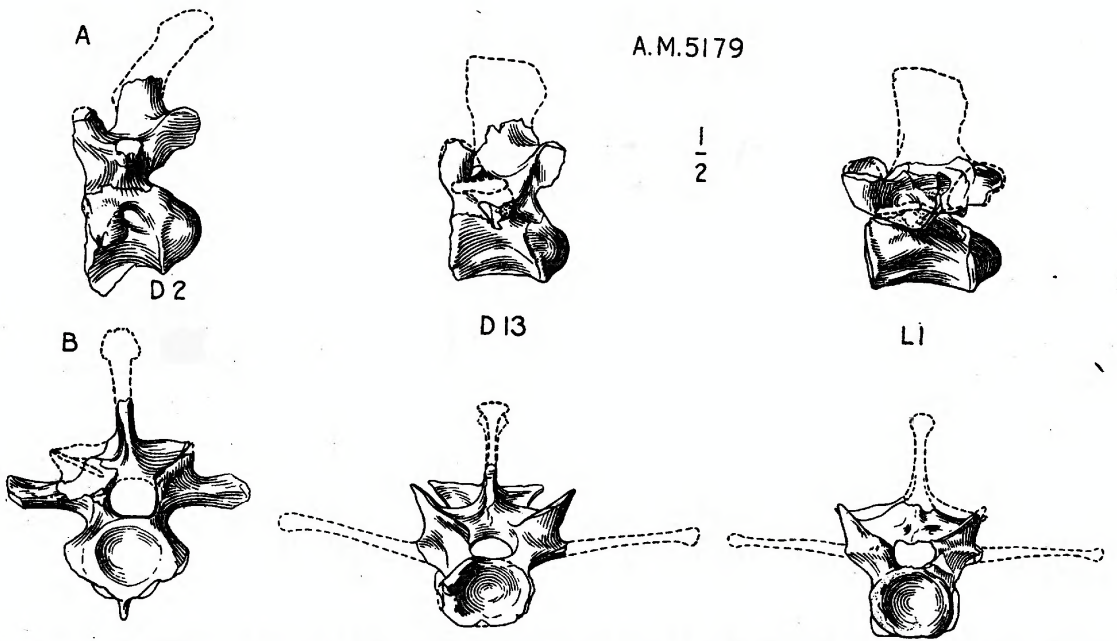

Fig. 4. *Leidyosuchus multidentatus*, new species. Type, dorsal and lumbar vertebræ, Amer. Mus. No. 5179. One-half natural size. A, lateral views, left side; B, anterior views. D2, D13, and L1, second dorsal, thirteenth dorsal, and first lumbar vertebræ, respectively.

process of the right side is well preserved. It is longer and more slender than in *C. americanus*. The parapophyses are prominent. The posterior ball is prominent and occupies a comparatively small portion of the posterior surface of the centrum. The chief distinction between this vertebra and the corresponding vertebra of *C. americanus* appears on the ventral view. In the present specimen the inferior surface of the centrum is decidedly constricted immediately posterior to the parapophyses; in *C. americanus* the centrum maintains a considerable width with only slight constriction. The median keel and hypapophysis show

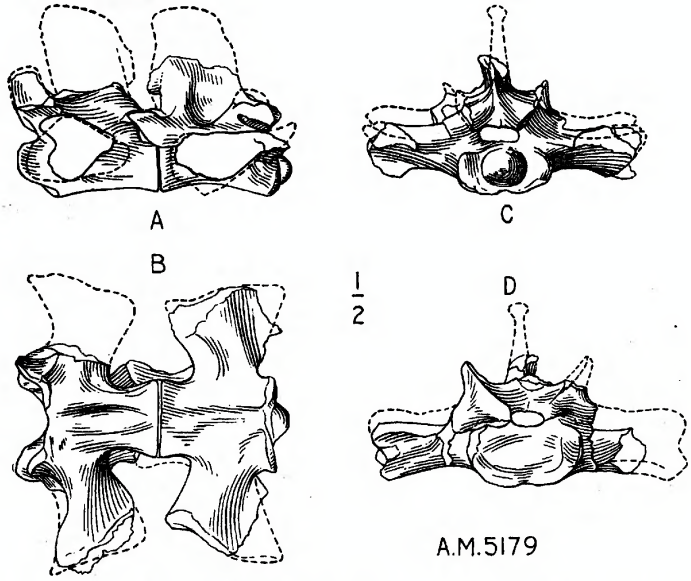

Fig. 5. *Leidyosuchus multidentatus*, new species. Type, sacrum, Amer. Mus. No. 5179. One-half natural size. A, lateral view, left side; B, inferior view; C, posterior view; D, anterior view.

less development in the present specimen than in *C. americanus*. The vertebra provisionally identified as Dorsal 2 is better preserved than Cervical 4. The base of the spine, the postzygapophyses, the prezygapophysis of the right side, the bases of the diapophyses, the parapophyses, and both ends of the centrum, as well as its inferior surface, are present. The prezygapophyses evidently had a greater width than the postzygapophyses. The bases of the diapophyses are located on the sides of the neural arch, slightly above the level of the arch-centrum sutures. The parapophyses are prominent; they occupy considerably less space

anteroposteriorly than in the corresponding vertebra of *C. americanus*. The flange surrounding the posterior ball of the centrum is prominent. The median keel is prominent; the hypapophysis is not preserved.

The second dorsal vertebra is fairly well preserved. The left pre- and postzygapophyses are preserved. The diapophysial processes arise slightly below the level of the prezygapophysis. These processes are situated far forward on the sides of the centrum; they are characterized by a pair of prominent ridges on their posterior surfaces. The parapophysial processes arise from the anterior portion of the sides of the centrum, slightly above the level of the middle of the centrum; the

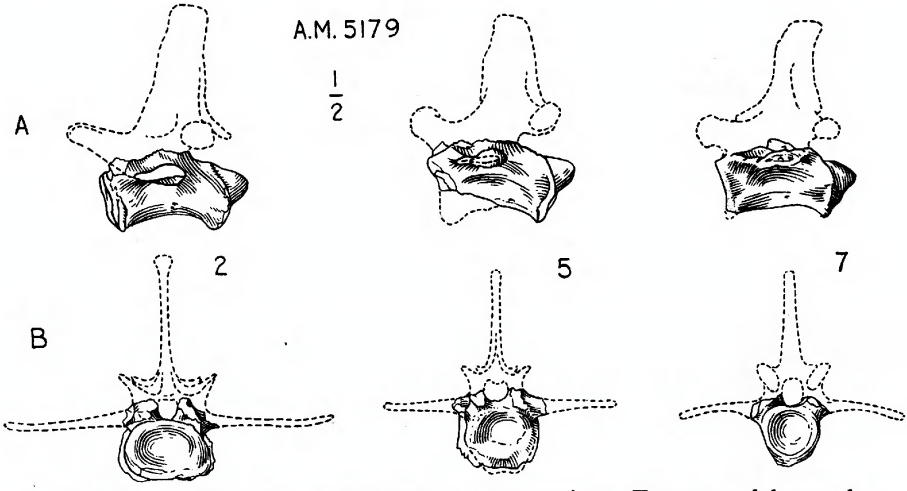

Fig. 6. *Leidyosuchus multidentatus*, new species. Type, caudal vertebræ, Amer. Mus. No. 5179. One-half natural size. A, lateral views, left side; B, anterior views. 2, 5, and 7, second, fifth, and seventh caudal vertebræ, respectively.

parapophysial surfaces face obliquely outward and downward. The hypapophysis is prominent. The ball at the posterior end of the centrum is prominent.

The vertebra identified as Dorsal 15 is fairly well preserved. In it the prezygapophyses are larger and much farther apart than the postzygapophyses. The transverse processes which undoubtedly supported both diapophysial and parapophysial articular surfaces, sprung from the sides of the neural arch about midway between the level of the zygapophyses and the superior border of the centrum. The centrum is rather short anteroposteriorly, and is broader than high. The inferior surface of the centrum is broadly rounded.

The first lumbar vertebra articulates fairly accurately with the last dorsal; the prezygapophyses of the former fit rather closely with the postzygapophyses of the latter, and the articulations of the centra agree closely. The broken bases of the transverse processes are not distinctive. The centrum is much longer than that of the last dorsal, and, like that centrum, is wider than high. Its inferior surface is broadly, though irregularly, rounded. The centrum is considerably longer than that of the last dorsal.

The sacrum is incomplete and has been considerably crushed vertically. The two sacrals are united by centra and by the right zygapophyses (the left not being preserved), but whether this union represents a true ankylosis is doubtful. The anterior articular surface of the first sacral is very large. The inferior surface of this vertebra is characterized by two parallel ridges. The inferior surface of the second sacral is broad and flat. The posterior surface of the centrum of Sacral 2 consists of a small posterior ball superposed on a concave surface; this condition is in decided contrast with the centrum of Sacral 2 in modern crocodiles, which is definitely concave. The transverse processes of both sacrals are stout.

The second caudal is incompletely preserved. The anterior cup is broader in proportion to its height than in the first lumbar. The posterior ball is small; it occupies only about half the breadth of the posterior surface of the centrum, and scarcely half of its height. Below the posterior ball the posterior surface of the centrum bends abruptly, facing both downward and backward. The inferior surface of the centrum is not rounded, but is broad and somewhat flat. It makes sharp angles with the sides of the centrum, and is ridged longitudinally with a faint keel. The posterior portion of the inferior surface bends sharply downward. The length of the centrum is the same as in the first lumbar.

The vertebra represented as Caudal 5 resembles that identified as Caudal 2 in many respects. The neural arch and spine are not preserved. The anterior surface of the centrum, as viewed from the side, is oblique in position, facing downward as well as forward. The cup is moderately deep. The posterior ball is small, occupying part of the upper half of the anterior surface of the centrum only; it is somewhat sharp in form. The lower portion of the posterior surface faces obliquely backward and downward. This oblique posterior surface evidently served for articulation with a chevron. The bases of the transverse processes spring from the upper borders of the sides of the centrum; the processes were evidently small. The inferior surface of the centrum is characterized by two

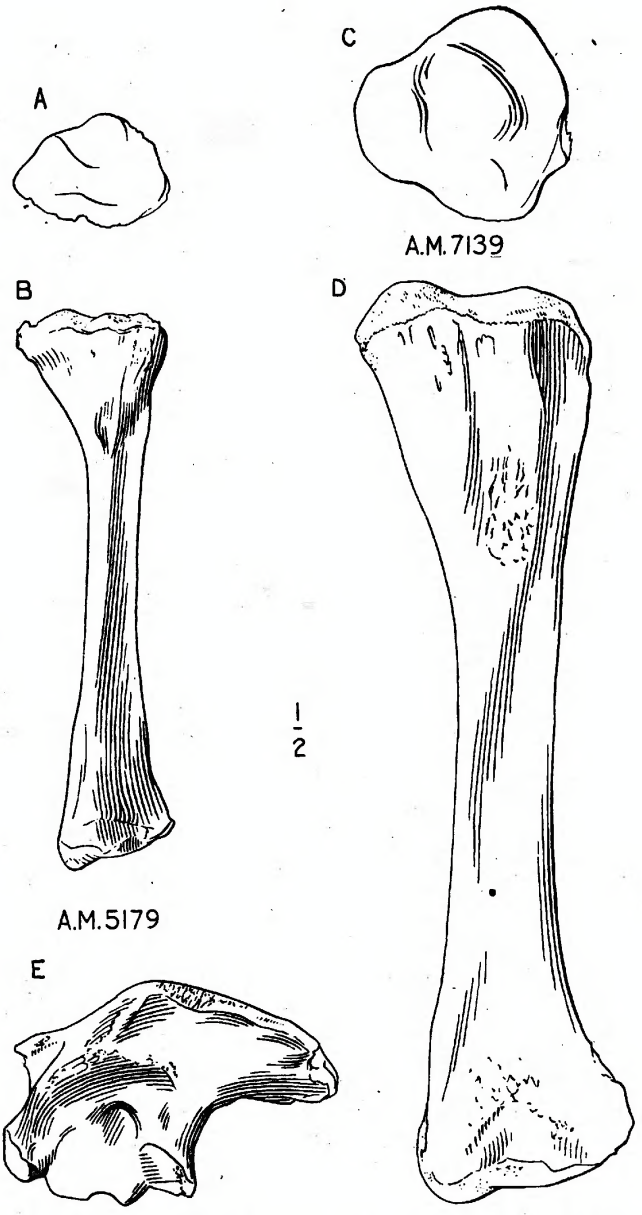

Fig. 7. *Leidyosuchus multidentatus*, new species. Type, left tibia and left ilium, Amer. Mus. No. 5179, and *Crocodilus americanus*, left tibia, Amer. Mus. No. 7139. One-half natural size. A, left tibia of *L. multidentatus*, superior view; B, the same, anterior view; C, left tibia of *Crocodilus americanus*, superior view; D, the same, anterior view; E, left ilium of *L. multidentatus*, external view.

longitudinal ridges that arch toward each other at the center of the midline. The centrum is slightly longer than that of Caudal 2, and slightly narrower.

The seventh caudal resembles the fifth in practically every respect except that it is slightly smaller. The anterior surface is not quite so oblique in position as in the fifth caudal. The posterior surface resembles that of Caudal 5. The inferior surface of the centrum is considerably narrower than that of Caudal 5.

The ilium of the left side is preserved. It is relatively small, and is relatively long in proportion to its height, as compared with an ilium of *Crocodilus americanus*. The posterior process is more slender, and is projected more directly backward than in the American crocodile. The pubic peduncle is relatively weaker than in the recent form, but the ischiadic peduncle is in a similar stage of development. A supraacetabular process, or thickening, is strongly developed in this specimen; it is very inconspicuous in *C. americanus*. The facets for articulation with sacral ribs, on the internal surface of the bone, do not occupy quite so much of the total area of this surface as in the recent form compared; they are not so closely in contact with each other, and apparently were not separated by a vertical flange of bone.

The left tibia only is preserved. It exhibits the normal characters of crocodilian tibiæ, except that the shaft is considerably more constricted than usual, and the proximal end is somewhat more expanded.

Length	137.5 mm.
Breadth, proximal end	39.
Breadth, distal end	30.
Breadth, at narrowest part of shaft	13.5